

# ROLE OF LAPAROSCOPY IN THE DIAGNOSIS OF ABDOMINAL DISEASES

THESIS  
FOR  
MASTER OF SURGERY  
( SURGERY )



BUNDELKHAND UNIVERSITY,  
JHANSI ( U. P. )



C E R T I F I C A T E

Certified that the work entitled  
"ROLE OF LAPAROSCOPY IN THE DIAGNOSIS OF  
ABDOMINAL DISEASES" has been carried out  
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C E R T I F I C A T E

This is to certify that the work  
"ROLE OF LAPAROSCOPY IN THE DIAGNOSIS OF  
ABDOMINAL DISEASES" which is being submitted  
as a Thesis for M.S. (General Surgery) was  
carried out by Dr. Ramendra Nath Tandon under  
my personal supervision and guidance.

The techniques and methods described  
were undertaken by the candidate himself and  
the observations recorded have been periodically  
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C E R T I F I C A T E

This is to certify that the work entitled "ROLE OF LAPAROSCOPY IN THE DIAGNOSIS OF ABDOMINAL DISEASES" which is being submitted by Dr. Ramendra Nath Tandon as a Thesis for M.S. (General Surgery) examination was carried out under my personal supervision and guidance. The techniques and methods described were undertaken by the candidate himself and the observations recorded have been periodically checked by me.



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## A C K N O W L E D G E M E N T S

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## C O N T E N T S

INTRODUCTION	1
REVIEW OF LITERATURE	6
MATERIAL AND METHODS	33
OBSERVATIONS	52
DISCUSSION	68
CONCLUSIONS	81
BIBLIOGRAPHY	I - XII
APPENDIX	

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\*\* I N T R O D U C T I O N \*\*  
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## I N T R O D U C T I O N

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By the application of highly developed techniques, medical science has achieved considerable results in diagnosing morphological and functional changes in the diseased organ. Then we, physicians, however, can not help feeling that each new technical achievement in the field of practical medicine provides an impulse liable to divert the practitioner from classical methods of diagnosis. Some procedures are put to one side and new ones brought in and modifications are made to improve the technique and as well as the equipment.

The starting point from which to identify an illness is, even today, the method of inspection, palpation, percussion and auscultation. In addition to clinical diagnosis technical achievement should be employed to complete the basic procedure.

The diagnosis and management of the abdominal diseases have ever been a challenge to the physicians in general and surgeons in particular. It is not an uncommon experience to find something

entirely new at the time of laparotomy. Some times such patients are explored unnecessarily just to find inoperable lesion.

The introduction of endoscopic method means the extension of the field of inspection from surface of the human body towards the inner parts. Among the several endoscopic methods, laparoscopy opened up the largest field for internal inspection.

The prime purpose of undertaking laparoscopy is direct visualization of intraperitoneal structures in order to detect presence or absence of tissue changes by inspection of gross anatomy and if needed biopsy may be taken of the most suggestive area of involvement.

For eighty years, the concept of laparoscopy has been known to surgical community. Although various diagnostic dilemma can be frequently resolved by laparoscopy, but the procedure is still greatly underutilized especially by general surgeons. The evaluation of difficult diagnostic problem, usually depends on clinical analysis, various highly expensive investigations and eventually diagnostic

laparotomy. This common approach some time results in undesirable delay in surgical treatment of intra-abdominal problems when the indications for surgical exploration are uncertain. Under such condition if a simple laparoscope is introduced into the abdominal cavity through a small incision under local or general anaesthesia, more often an early diagnosis at far less discomfort, expense, cosmetic compromise and operative risk to the patients can be made.

Various terms have been given to this endoscopic method. Terms such as 'Ventroscopy' (Ott), 'Coelioscopy' (Kelling), 'Laparoscopy' (Jacobaeus), 'Organoscopy' (Bernheim), 'Peritoneoscopy' (Orndoff), 'Abdominoscopy' (Steiner) are synonyms for one and the same examination.

Laparotomy, undoubtedly, provides all the means of inspection and palpation of all the intra-abdominal viscera, but has its own complications, and some times surgeon may be hesitant to under take laparotomy when he is uncertain about the diagnosis. Though the lapatotomy is very safe nowadays but exploration is not justifiable in the case of

peritoneum covered with metastatic implants or a liver with metastatic carcinoma.

Laparoscopy is no substitute for complete exploratory laparotomy and those who represent it as such do both procedures an injustice. It only provides visualization of external surface of the organ and not the palpation of deeper structures, and is contraindicated in certain conditions. In certain cases, however, general exploration is not required to establish the diagnosis and carries risks which outweigh the rewards. These are the cases where laparoscopy offers a valuable help to the surgeon.

Within the limitations of its usefulness laparoscopy offers a valuable extension of the internist's armamentarium while avoiding the greater risks and difficulties of the alternative exploratory laparotomy in selected cases. Laparoscopy is and should be the greatest asset to good surgical procedure and diagnosis. If surgeon gets greater information about the pathological changes in the abdominal cavity, he can plan his elective surgery for ultimate good of the patient.

Laparoscopy is a safe method for diagnosing and even taking biopsy whenever necessary in difficult abdominal problems with little trouble to the patient under direct vision. Therefore, the present study is an attempt to evaluate the role of laparoscopy in the diagnosis of abdominal diseases and certainly to select the best possible approach to treat the underlying pathology.

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 REVIEW OF LITERATURE  
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## REVIEW OF LITERATURE

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In the early centuries of civilization, students of human anatomy and disease devised methods to project their curious, if not scientific, vision beyond the orifices of the body cavities. It is recorded that the ancient Hebrews evolved a practical speculum for examination of the vaginal canal and the ruins of Pompeii revealed that a technique of anorectal examination, utilizing an expending type of anal speculum, was employed even in those days.

Medical literature reveals that interest in the study of inner recesses of the human body did not abate. Through the years, the curious were relentless in their investigations into the internal regions of less accessible cavities. However, it was not until 1805 that Phillipp Bozzini of Frankfurt invented an instrument to project the light of a candle through a double lumen urethral cannula for inspection of the inner surfaces of the urethra and bladder. The only reward for this investigator's

unusual curiosity was a reprimand from the Faculty of the Medical Academy in Vienna.

Satisfactory inspection of cavities with small orifices or without natural orifices required inventive assistance to make possible the introduction of a source of light. During the following 75 years, numerous unsuccessful attempts were made by many scientists and technicians to perfect an instrument for adequate telescopic examination of the bladder. Development of incandescent light in 1880 made possible the modern lighted telescope which has since been developed to such a high degree of excellence.

The era of internal illumination of the body cavities began in 1878 with the introduction of the cystoscope by Max Nitze. Since that time, the cystoscope has been improved and brought to its present state of perfection. Once the value of cystoscope was established, it is not surprising that this method of illumination was tried in other cavities. The peritoneal cavity offered a challenge to skilled telescopist.

Edison (1880) invented the incandescent lamp and Newman (1883) described an instrument

using the incandescent lamp as a light source. Biosseau de Rocher (1889) separated the ocular part of the cystoscope from the sheath thus allowing the use of multiple telescopes which provided greater latitude of observations and made manipulations through the sheath possible. At the close of nineteenth century cystoscopy and other open cavity endoscopic procedures such as bronchoscopy, laryngoscopy and oesophagoscopy were well established and in daily use.

Ott (1901, 1902, 1903), the famous Russian Gynaecologist, was the first to introduce endoscopic inspection of the abdominal cavity in 1901. He called his method, ventroscopy by which he inspected the abdominal cavity with the help of a head mirror and of a speculum introduced into the colposcopic opening.

A few months later in the same year, the first endoscopic examination of the abdominal cavity with optical instrument was performed. The German Biological Medical Society held its 73rd session on 23rd September 1901 in Hamburg when the Drisdien Professor Georg Kelling reported on his oesophagoscopies, gastroscopies and celioscopies.

One year later his report was published. At the end of his paper Kelling devoted 25 lines to the description of his celioscopic method which he had demonstrated on a dog at the above mentioned conference.

In the same periodical, Stockholm lecturer Jacobaeus published his paper. He discussed possibilities of inspecting the three great serous cavities; peritoneal, pleural, pericardial. On the basis of his own experiments, he named the first method as laparoscopy, and the second as thoracoscopy and saw no further perspectives for the endoscopic examination of pericardial cavity.

Unaware of Kellings report, Jacobaeus again described the method of peritoneoscopy. Compared with Kellings method his procedure is less advanced as he did not use separate pneumoperitoneum needle but introduced air by means of a rough trocar and cannula used for the introduction of the cystoscope. On the other hand he made a step forward by using his method on human beings and stressed and restressed its harmlessness when applied to patient suffering from ascitis.

In 1911 Bernheim of John Hopkins Medical School regarded pneumoperitoneum as particularly advantageous. He introduced a cannula of 1/2 inch bore through the upper abdominal wall and viewed the viscera with reflected light withdrawing the anterior wall of the stomach through the cannula. He incised and inspected the mucosal surface. He apparently received no encouragement in this work from his senior staff and this type of examination was discontinued.

In 1912 Jacobaeus in a monograph on peritoneoscopy reported on 45 peritoneoscopic examination of human beings and described liver changes in various diseases.

In the same year Nordentoeft of Copenhagen devised an instrument for visualization of the female pelvis and used Kelling's technique and with the patient in the Trendelenburg's position.

Orndoff in 1919 reported considerable experience with Kelling's technique and found the method valuable in the diagnosis of extra-uterine pregnancy and tuberculous peritonitis. He modified

the procedure by using oxygen instead of air for the creation of pneumoperitoneum and by introducing telescope under direct observation with fluoroscope. Orndoff named the procedure "peritoneoscopy". He reported the examination in more than 70 cases, which included ovarian cysts, pyosalpinx and ectopic pregnancy.

Although Alvarez, Peterson (1921, 1922) and others had demonstrated the great advantage and complete safety of carbon-dioxide pneumoperitoneum, the procedure lost considerable favour.

However, Sante (1927) announced the outcome in 1000 cases in which pneumoperitoneum was performed preliminary to radiological examination. His technique employed air as the agent, and no untoward effects were observed.

After 10 years interval, relying on Jacobaeus report, Roger Korbsch (1921, 1922) rediscovered peritoneoscopy and developed an instrument and described his method in detail. He discarded cystoscope and used a separate pneumoperitoneal needle. He showed the first coloured peritoneoscopic picture in a lecture.

In 1924 in his paper "Abdominoscopia" the American Steiner described his newly discovered instrument and method, and also discussed its indications. He made the same mistake as Jacobaeus, in not using a separate pneumoperitoneal needle and perforating the abdominal wall with telescopic trocar. In the same periodical and the same year, the Swiss, Zollikofer (1924) tactfully referred to Kellings and Jacobaeus's earlier merits in the field and described his own peritoneoscopic results.

In 1925, Nadeau and Kampneier published a review of the literature, in which 200 cases of peritoneoscopy were described. These authors also gave a complete description of the technique for telescopic examination.

The most outstanding exponent and promoter of peritoneoscopy, Kalk published his first report in 1929 on 100 peritoneoscopic examination, describing instrument of his own design. Its system of lenses has so called lamp carrier. For the perforation of abdominal wall he used a knife like pointed instrument and produced pneumoperitoneum by a pneumothoracic needle. Disregarding some slight modifications, this is still the simplest

peritoneoscopic instrument most frequently used which unlike Jacobaeus's instrument, can be used not only in patients with ascitis but also in cases where there is no abdominal fluid.

Instrumental intervention combined with peritoneoscopy was first described by Fervers (1933), who used a cystoscope suitable for manipulation on a peritoneoscope. Under visual aid he burned abdominal adhesions with an excision instrument and removed tissues from the abdominal cavity for biopsy. Henning and Mancke (1933) described their peritoneoscope which had two system of lenses, one at  $180^{\circ}$  and other  $90^{\circ}$ .

Ruddock's (1934, 1937) peritoneoscopic construction represents an essential advancement. It contained among other things, a biopsy apparatus build in the axis of the instrument.

In 1939, Ruddock analysed his experience with 900 cases performed successfully, including 58 cases of ectopic pregnancy and proved it to be a method with high degree of accuracy at negligible risk. This report was one of the most important publication favouring laparoscopy and it was not until this paper, which provided others an incentive

to explore its alleged diagnostic potentialities, that much impetus was given to the technique.

Every discovery of the additional equipment or procedure, increasing the diagnostical value of laparoscopic methods and enlarging the field of their application was a significant step forward in the history of laparoscopy.

Great progress has been made in this field, in the first place the directed liver biopsy method evolved by Kalk, the peritoneoscopic cholecystography, use of peritoneoscopy in gynaecology, the introduction of coloured photoperitoneoscopy, then with advanced techniques peritoneo-cinemetography and peritoneoscopic television relay. In this connection it is worthwhile to mention peritoneoscopic spleenoportography initiated by Henning. As well as the joint application of peritoneoscopy and pneumoperitoneal X-ray examination and choledochoscopy devised by Wildegans (1953).

The publication of monograph connected with the problems of peritoneoscopy represents further important event in the history of peritoneoscopy. Kalk and Brühl's monograph (1951)

"Lectifaden der laparoskopie a gastroskopie" 'is still considered a basic manual for diagnostic procedures.

Benedicts (1951) "Endoscopy" has a long chapter on peritoneoscopy with several coloured figures showing the changes that can be observed.

Kalk's (1957) other monograph on "liver" is no less important. His scientific achievements are based primarily on the method of peritoneoscopy and guided direct liver biopsy.

In the Italian literature such important works as Bertolani's (1958) "laparoscopia with laparografia nella pratica medica" and Lenzi, Cavassini and E. Lenzi's (1960) "La laparoscopia" should be mentioned. Wittman published his ~~book~~ 'Peritoneoscopy' in 1966.

In more recent years Frangenheim, Thoyer-Rozat Albano and Cittadini, Steptoe, Cohen and Semm have made important contribution to laparoscopy, clarifying the indications and contraindications, together with difficulties and dangers. Comprehensive review of literature is being presented here in subgroups along with it's value in clinical cases as a method of an important harmless investigation.

GROUP 'A' :

Under this group patient with suspected liver diseases were kept. To diagnose or to confirm the diagnosis of patient with liver disease has been a great problem for both physicians as well as surgeons. To overcome this problem various investigative procedures have been evolved. In spite of recent ultrasonography and isotope scanning, diagnosis remains obscure or these investigations give false positive as well as false negative results. In most of the institutions in the world, these investigations are not available. In such instances a simple procedure of laparoscopy helps the treating physician. Direct view of the liver surface and biopsy without danger, is highest achievement of this method.

Antia (1963) from Bombay utilized it extensively for establishing suspected diagnosis of cirrhosis of the liver. The diagnostic accuracy as checked by subsequent surgery was 94 percent in over 200 cases.

Ivan et al (1964) conducted a study to diagnose primary liver diseases as well as secondary malignant deposits on liver. 69 cases of suspected malignant diseases were included in this study.

After laparoscopy 36 patients were diagnosed to have secondary malignant deposits on liver and peritoneum. No secondaries could be detected in 30 patients and in 3 patients examination was abandoned. Laparotomy was undertaken in 30 patients with no liver involvement, again 24 patients were confirmed not having secondary deposits on liver and 4 patients had secondaries while 2 never turned up for further investigations. Thus laparoscopy was helpful in 59 out of 69 cases of suspected malignant diseases. In 57 cases of suspected primary liver diseases, laparoscopy was found more useful as the success rate was 89.4 percent.

Scott et al (1967) conducted laparoscopic examination to evaluate the value and indications for laparoscopy. An important by-product of this small study on 100 patients has been the formulation of rather restricted indications for performance of laparoscopy. Fifty one patients were evaluated for liver diseases with spectacular success.

Jacobs and Morobe (1969) reporting on 3,000 such laparoscopies for chronic liver diseases, noted that the procedure corrected false clinical diagnosis in more than 14 percent of patients,

confirmed the clinical opinion in 53 percent and yielded interesting complementary findings in another 23 percent. Diagnosis is often made by inspection at laparoscopy. Accuracy can be improved by biopsy under direct vision considerably.

Mosenthal (1972) planned to use laparoscopy in future to rule out metastatic disease of the liver in the presence of suspicious liver scans in cases of carcinoma of the lung and carcinoma of the breast before embarking on radical curative surgery, only after amazing results of his own study. In this study 50 patients with various indications mostly with suspected liver pathology were included. In 84 percent cases pathology was detected.

Suduca et al (1972) have also reported in favour of laparoscopy with biopsy under direct vision to establish with certainty the diagnosis of primary carcinoma of the liver.

Berci et al (1973) conducted laparoscopy on 70 patients with various indications. 26 patients were examined to evaluate the liver disease. 5 patients were diagnosed as cirrhosis of the liver. Out of 7 suspected patients of hepatoma, in 6 cases

clinical diagnosis was ruled out and in one patient cirrhosis with metastatic implants was found. In 9 cases with known primary carcinoma, liver was suspected to have secondary implants as liver was palpable but on 3 occasions only metastatic implants were seen. One patient with confirmed percutaneous biopsy was found to be with normal liver after laparoscopy. Similarly one patient with clinical diagnosis and a positive scan for metastasis had normal liver confirmed by laparoscopy.

Etienne et al (1973) reported 43 patients with primary carcinoma of the liver, of whom 34 had round neoplastic tissue on the surface of the liver. In 28 patients multiple nodules were seen on the surface, while 6 had single tumour. In 2 other patients the surface of the liver was raised because of deeply placed tumour. In 7 patients laparoscopy failed to visualize any neoplastic tissue on the liver.

Gaisford (1975) reported the value of this technique in 75 consecutive cases of various undiagnosed abdominal conditions, mostly having suspected liver disease. He also performed peritoneoscopic transhepatic cholecysto-cholangiography in 6 cases of this series with

deep jaundice and thus establishing the cause of jaundice in all 6 cases. During this procedure he reported one complication. In 45 patients laparotomy was avoided while in 15 cases prompt laparotomy was indicated.

Saleh (1976) conducted laparoscopic examination as an alternative approach to unresolved intra-abdominal diseases in 49 patients. 29 patients were of inconclusive liver scans. In 21 patients laparoscopy revealed pathology while 4 had normal liver and in 4 patients examination failed, because of diffuse adhesions.

Friedman et al (1977) conducted laparoscopic examination with the aim to get an early diagnosis and to reduce hospital stay, as well as the expenses. Thirty one patients underwent laparoscopic examination to evaluate the status of liver only after they had been investigated thoroughly. In 9 proven normal liver, malignancy was detected in 5 cases and one diseased liver was found normal. Three patients were denied percutaneous liver biopsy because of coagulation defect, were diagnosed by laparoscopic examination without complication. Four patients of obscured jaundice were also diagnosed. Twelve out

of 20 patients with positive scans were proved to be false positive scans.

Whitcomb et al (1978) published their study on 38 patients with focal liver disease where percutaneous biopsy had failed. Laparoscopy with biopsy under direct vision helped in detecting pathology in 36 patients. On 2 occasion bleeding was noted as a complication.

Friedman and Wolf (1978) conducted laparoscopic examination under local anaesthesia on 140 patients. In this study 77 patients with liver disease were examined and biopsied under laparoscopic vision. On 73 occasions success was realized while in 4 cases adhesions prevented visualization of the liver and so the biopsy could not be taken.

Hall et al (1980) carried out laparoscopic examination on such 43 patients of hepatomegaly where diagnosis was not clear or there was suspicion of malignancy. They were able to detect metastasis in 26 and primary liver disease in 8 patients.

Coupland et al (1981) reported 4.5 percent complications in a series of 236 patients with various indications. In forty-four patients with hepatomegaly, cause was detected in 90.9 percent cases.

GROUP 'B' :

Some times patients are presenting with vague symptomatology and a lump in abdomen with no relation to the symptoms. On many occasions investigation fail to detect the origin of lump and under such circumstances leparoscopy comes to the rescue of puzzled surgeon who is not ready to perform diagnostic laparotomy because of many reasons.

Ivan et al (1964) reported their experience on 130 patients with 2 cases of undiagnosed intra abdominal lumps. Diagnosis was possible after laparoscopy.

Mosenthal (1972) included 10 patients of intra-abdominal lumps, in his series of 53 patients with various other indications. In 6 cases diagnosis was confirmed while 3 patients were having retroperitoneal tumours and one was having intramural tumour of sigmoid.

Berci et al (1973) reported 11 patients with palpable abdominal mass, where diagnosis could not be made inspite of all investigations, last resort could have been diagnostic laparotomy but laparoscopy avoided laparotomy and the diagnosis was made in all cases with tissue biopsy to confirm the pathology.

Gaisford (1975) performed laparoscopic examination on 75 patients under local anaesthesia. In this series 25 patients with suspected primary or recurrent abdominal cancer were found, by laparoscopy, to have inoperable lesion and thus spared of unnecessary laparotomy.

Sugarbaker and Wilson (1976) reported results of 23 laparoscopic examination in which 3 patients with undiagnosed abdominal lump could be diagnosed.

Friedman et al (1977) reported successful results in 6 out of 9 patients with undiagnosed lump in abdomen. This was very much helpful in treating the patients.

Saleh (1978) published his paper to present data showing that in unresolved intra-abdominal

diseases, peritoneoscopy with directed biopsy is an important adjunct to our modern armamentarium. In his series of 49 patients, 7 were with vague abdominal lumps. On 6 occasions diagnosis was obtained but single failure resulted due to extensive abdominal scarring.

Friedman and Wolf (1978) carried out laparoscopic examination under local anaesthesia with intravenous sedation and analgesia. In this series 10 patients were with ill defined abdominal masses. In 7 patients, laparoscopy clarified the location of a mass, palpable through the anterior abdominal wall.

Hall et al (1980) conducted laparoscopy under local anaesthesia. In this series 16 patients were examined to get the origin of intra-abdominal swelling. In 13 cases diagnosis was made with histological proof in 7 cases.

Recently Coupland et al (1981) published their study from Australia. They succeeded in determining the pathology of intra-abdominal masses in 82.5 percent of cases. They reported complications in 11 patients out of 236 patients, in the form of

bleeding, perforated bowel, subcutaneous emphysema, pain, tenderness and air needle entered stomach on one occasion.

GROUP 'C' :

Invariably patients are presenting with vague abdominal pain of long duration and associated features, even after a long list of expensive investigations diagnosis remain cloudy. Number of studies have been carried out to see the results of laparotomies in such patients, result has been good but on some occasions no pathology could be detected and unnecessarily laparotomy was carried out. But now this situation can be avoided by using laparoscope which can spare unnecessary laparotomy.

Though enough literature is not available even then on some occasions such patients have been included in various studies.

Wittman (1966) have reported few cases of chronic pain in abdomen where laparoscopy revealed some or the other cause for chronic pain in abdomen. He is of the opinion that tubercular process in peritoneal cavity, as a cause of pain, can be detected by laparoscopy.

Mosenthal (1972) included 3 patients with chronic pain in abdomen in his study. In none of the case, cause of pain could be detected. Later on laparotomy was undertaken, on the occasion no lesion was found while other patient harboured a walled off pelvic abscess from sigmoid diverticulum. This case must be classified as false negative result of laparoscopy.

Anteby et al (1973) has used laparoscope to evaluate the cause of prolonged pelvic pain in 74 patients. In 26 patients no pathological condition was seen.

Friedman and Wolf (1978) conducted laparoscopic examination of non gynaecologic nature on 140 patients. They carried out laparoscopic examination in 6 patients with chronic or recurrent pain and were able to confirm normal intra-abdominal status in 5 patients while in one case, procedure was unsuccessful because of adhesions.

Hall and co-workers (1980) conducted study on 42 patients with abdominal pain and loss of weight associated with very vague symptoms. Extensive investigations had failed to reveal any abnormality.

Laparoscopy detected pathology in 10 patients and 8 of them had histological proof of malignant disease. They found 2 benign lesion, one had an ovarian cyst and other had a band adhesion.

Geake et al (1981) performed laparoscopic examination to diagnose tubercular peritonitis in 75 patients. The characteristic features were uniform miliary tubercles, studding the visceral and parietal peritoneum together with numerous adhesions between bowel loops, liver capsule and abdominal wall. Guided biopsy yielded a definitive diagnosis in 56 cases. 45 patients in this series presented chiefly with pain in abdomen of long duration.

#### GROUP 'D' :

The catastrophic potential of abdominal problems that are currently included in the category of 'acute abdomen' has been recognized since the era of Hippocrates. The clinical picture generally referred to as acute abdomen is a frequent problem. Acute abdominal pain requires prompt investigation and often presents an intriguing diagnostic challenge to the physicians. Quick accurate working diagnosis is needed so that a correct plan of treatment may be instituted promptly. Sometimes diagnosis is easy

but on certain occasions diagnosis is not possible inspite of all possible investigations. In such cases laparoscopy gives a prompt diagnosis and thus correct treatment can be instituted.

Anteby et al (1973) carried out extensive laparoscopy on patients with pelvic pain. 70 patients with acute pain were investigated for suspected ectopic pregnancy. The suspicion was confirmed only in 17 patients and they were promptly operated. In the remaining 53 patients few were operated upon because of ruptured corpus luteal cyst. In 48 patients operative intervention was avoided. In 25 patients laparoscopy was carried out to confirm salpingitis or to rule out appendicitis. In 12 patients salpingitis and in 5 cases appendicitis was confirmed. On the basis of clinical diagnosis laparotomy would have been performed on 25 cases but was avoided on 16 occasions after the establishment of correct diagnosis by laparoscopy.

Gaisford (1975) reported a interesting case in his series of 75 patients. One patient, an old lady presented with vague persistent abdominal pain of several hours duration without nausea or vomiting. Minimal abdominal tenderness was present with hypoactive bowel sounds. Physical signs and

laboratory findings were suggestive of acute process but abdominal X-ray showed nothing abnormal. Laparoscopy was performed under local anaesthesia to reach the final diagnosis of infarcted bowel which was resected promptly.

Sugarbaker et al (1975) conducted a study after selecting 56 patients of acute abdomen. In 27 patients definite diagnosis was made and they were operated. Six of them had no pathologic lesion. Rest of the patients underwent laparoscopy. In 18 patients diagnosis was made, they did not require laparotomy. While 11 patients needed prompt surgical treatment. On one occasion laparoscopy failed.

Gomel (1976) published one paper in which he emphasized on laparoscopic examination in cases with lower abdominal pain and acute pain in abdomen, where quick diagnosis is wanted to treat the patient on right lines. Laparoscopy is of special value when clinical and laboratory findings for abdominal pain fail to determine a cause. Negative laparoscopy is reassuring to both physician and patient and is significant when emotional factors are suspected.

Wheless (1976) reported the role of laparoscopy in differentiating between pelvic

inflammation and acute appendicitis. Visualization of appendix is not necessary to confirm the diagnosis. If history, examination and laboratory findings are suggesting acute lower abdominal problem and uterine adenexa is normal per laparoscopic view then it is wise to explore caecal region for appendicitis. If, however, fallopian tubes have been found to be swollen inflamed and spilling purulent material from fimbrial end, the chances of simultaneous appendicitis is so remote that operation is not warranted.

Cortesi et al (1979) carried out laparoscopic examination on 317 patients admitted in emergency ward as a case of acute abdomen. Negative findings were found in 89 patients. After the evaluation they concluded that laparoscopy must become as routine as radiologic examination for acute abdomen.

Hall et al (1980) reported their experience of 9 patients with acute abdomen. They were able to get the diagnosis on 5 occasions and 4 cases did not show any pathology.

Jersky et al (1980) submitted 27 patients with suspected appendicitis to laparoscopic

examination, surgery was performed on every occasion to compare findings. By laparoscopy, findings could be obtained only in 14 cases. On 13 occasions laparoscopy failed to suggest any finding. Laparotomy provided correct diagnosis in all 13 cases and corrected diagnosis in 3 out of 14 diagnosed cases. This study concludes that, laparoscopy is unlikely to reduce significantly the incidence of negative laparotomies.

Leape and Ramenofsky (1980) performed laparoscopy on 32 patients with suspected appendicitis. On 24 occasions they found normal appendix, 4 of them in fact had acute appendicitis.

Anderson and Bridgewater (1981) performed laparoscopy on 27 patients with acute abdominal pain. 19 of the 27 patients (6 male and 21 female) were admitted with the provisional diagnosis of appendicitis. Following laparoscopy only 9 underwent appendicectomy and further 3 underwent laparotomy and 15 patients had laparoscopy as the sole procedure and all were discharged from hospital without needing further surgery. Of these patients in operative group 4 had their incision modified as a result of laparoscopy.

Deutsch et al (1982) conducted laparoscopic examination with the aim to reduce negative appendicectomies. After excluding acute gynaecological conditions, 36 women of fertile age group and with a diagnosis of appendicitis were subjected to laparoscopy before surgery. As a result of laparoscopy, surgery was cancelled in one third of cases, as they had acute gynaecological condition not requiring surgery. On one occasion negative laparotomy was done after laparoscopy.

GROUP 'E' :

In the present era of mechanization, the life has become very fast. Every day large number of population is involved in motor vehicle accidents all over the world. About 10 percent of the patients are admitted to emergency. About half of them involve diagnosis and management of an abdominal problem that is usually hemorrhagic and rarely a perforated viscera (Tostivint).

In patients with multiple trauma, the classic symptoms do not apply and local signs are absent or misleading. This is especially true in cases of thoracic trauma in which a large percentage have associated abdominal lesions. Symptoms and signs

associated with haemorrhage usually appears late, either marked by compensatory mechanisms or drowned in a general picture of shock. Important delays that can prove fatal may occur, or the patient may be subjected to an unnecessary laparotomy that proves negative. Under such circumstances laparoscopy is unequaled in determining intra-abdominal status. Though little literature is available but the results are much satisfying.

Tostivint (1971) in the light of 75 such laparoscopic investigations found this procedure unequaled in determining intra-abdominal status. On 20 occasions laparoscopy was negative, in 6 cases sub-serosal hematomas were not associated with hemoperitoneum. Five retroperitoneal hematomas were detected, 2 of which were severe and required surgery. 44 patients had hemoperitoneum and cause of hemoperitoneum was detected in every case with the exception of massive hemoperitoneum. Laparoscopy is far superior to paracentesis with or without peritoneal lavage. It avoids diagnostic delays that could prove disastrous. A negative laparoscopy allows the surgeon to proceed with confidence and security in treating other traumatic lesions.

Mosenthal (1972) reported results of laparoscopy in 3 patients of blunt abdominal trauma. In 2 cases no operation was indicated but in one case laparoscopy may well have saved a life because peritoneal lavage was not suggestive of intra-abdominal hemorrhage while laparoscopy revealed clots in sub hepatic region hiding tear in hepatic artery.

Cortsi et al (1979) conducted laparoscopic examination on a large group of patients with various indications. In this study 95 patients with abdominal trauma were included. In 56 patients hemoperitoneum was found ; in 8 cases perirenal hematoma was detected and in two cases peritoneal effusion was detected. In 29 cases negative laparoscopy was found.

GROUP 'F' :

From simple inspection of abdominal viscera people have shifted to undertake inspection and palpation of more complicated and deeper structures like pancreas.

Meyer Burg (1972) first reported successful inspection and palpation of pancreas, introducing laparoscope through infragastric route and reaching through lesser sac (Strauch 1973). Cuschieri et al

(1978) used it in the diagnosis and management of pancreatic diseases.

Berci et al (1973) and many other workers have reported, satisfactory results in diagnosing the underlying pathology for jaundice by undertaking laparoscopy with transhepatic cholecysto-cholangiography.

Sotnikov, Ermolov and Litvinov (1973) reported laparoscopy results in 65 patients with oesophageal carcinoma, seeming candidates for resection, and found intra-abdominal metastasis in 16 cases. Robinson and Smith (1976) recommended laparoscopy prior to breast surgery when liver abnormalities appeared to be present clinically. Thus armed with this information, obtained via laparoscopic inspection of the peritoneal cavity, the indication for a planned radical operation may be strengthened or the procedure modified in favour of palliative method of management.

Meyer Burg and Ziegler (1978) reported their experience of inspection and biopsy of intra-abdominal lymph nodes during laparoscopy.

### Complications :

Laparoscopy is a procedure involving high degree of technical skill and it makes the operator prone to errors and patients susceptible to complications. The combination of multiple additional diagnostic procedures under visual control with the use of electro-surgery further contributes to the patient risk.

Accidents have been recognised ever since the introduction of this procedure. Ruddock (1957) in his long series of patients reported one case of fatal haemorrhage and 8 instances of puncture of the intestine.

Antia from Bombay (1952) reported a mortality of 0.2 percent.

Any time needle, trocar and cannula are passed into peritoneal cavity, intra-abdominal structures may be injured. However, the incidence is very low. Ruddock (1957) reports 8 perforations in 2500 cases.

A review of 14,000 cases (Vilardell, 1964) reveals sixteen deaths. These were due to bile peritonitis, haemorrhage, air embolism, general

peritonitis, hepatic coma, necrosis of the gall bladder and lung abscess.

Penfield (1977) collected 19 instances of laceration of a major blood vessel such as the aorta or common iliac artery by surveying 25 contemporary laparoscopists. In 16 out of 19 cases, laparotomy was performed promptly and vessel was repaired by vascular surgeon. These patients survived without sequelae. Remaining three patients sustaining trocar puncture of the aorta or common iliac artery, succumbed. According to Gomel (1976), complications associated with laparoscopy are few, they may be severe and occasionally fatal. They usually occur in the hands of untrained individuals, undertaking laparoscopy and when safety measures are overlooked. The greater proportion of complications occur in establishing the pneumoperitoneum and in inserting the trocar. Complications are also associated with the use of electro-surgical units in operative laparoscopy, such as electric burns with ensuing necrosis, perforation and peritonitis..

The most frequently encountered complications are : (1) puncture of vessels, either

intra-abdominal or of the anterior abdominal wall;  
(2) perforation of intra-abdominal viscera ;  
(3) parietal or omental emphysema ; (4) effects  
of high pressure gas injection, either  
cardiorespiratory embarrassment, gas embolism,  
mediastinal emphysema and pneumothorax, rupture  
of diaphragm or aggravation of existing hernias  
(5) anaesthetic complications ; and (6)  
complications associated with electrocoagulation  
during operative laparoscopy.

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M A T E R I A L   A N D   M E T H O D S  
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## M A T E R I A L   A N D   M E T H O D S

This study was conducted at Maharani Laxmi Bai Medical College and Hospital, Jhansi. The cases in this study were selected from all those patients who were admitted in surgery wards or referred from other wards. Most of the patients were those who could not be diagnosed inspite of usual investigations and few were examined to confirm the diagnosis.

### MATERIAL :

Equipment can be classified into four groups according to the purpose for which they are used.

- (i) Laparoscope and accessories.
- (ii) Instrument for creation of pneumoperitoneum.
- (iii) Liver biopsy needle.
- (iv) Endophotographic equipment.

#### (i) LAPAROSCOPE AND ACCESSORIES :

The laparoscope used in this study was MLW Laparoscope 427.0314 made in German Democratic Republic.

(a) Telescope :

In contrast to the older reflective lens system present laparoscope is a complex optical system of rod and lens, and fibre - glass relay system transmits light by total internal refraction. Telescope consists of central image transmitting system and outer illuminating system. The lens system with an, adjusting eye piece permits magnification and general observations. On one side of proximal end of the telescope, is, an adapter to fit fibre optic cable for transmission of light from the light source to it. Various types of telescopes are available but in practice either straight or fore-oblique (130 degree) telescope is used.

Fore-oblique telescope facilitates the viewing of certain recesses like anterior surface of the liver, parietal peritoneum and adhesions, if they are present. In such situations the more popular "endon" viewing telescope may not be much informative.

(b) Flexible fibre optic cord :

The cable connects the light source to the telescope. It has got an inner fibreglass optic system of 3.5 mm diameter and an outer protective covering of plastic material. This cord is 1800 mm

long and carries sockets on both ends which snugly fits into light source and on the adapter on telescope.

The simple small incandescent lamp attached to the tip of the optic system has been replaced by the fibre optic cold light. This was only possible after the introduction of quartz rod by Fourestier. This was also very fragile. Usually bulky cooling devices had to be provided to reduce the temperature of the proximal bulb. In fibre optic relay system, light from a powerful source outside the abdomen is passed into the abdomen through fibres, the cold light system thus solving both the problems.

(c) Light source :

This light projector has got two light taps arranged at the upper head, to which fibre optic cord is attached. Light is produced by a halogen bulb of 150 W power. Intensity of the light can be changed according to choice and necessity by selecting different switches provided. This light projector ensures a high power at a large output aperture for fibre optic light guides.

(ii) INSTRUMENTS USED FOR CREATION OF PNEUMOPERITONEUM:

(a) Needle :

Various types of needles have been used in past. But at present the needle introduced by Hungarian physician Verres is commonly used. In this study also

Verres needle was used. This needle is a double cannula needle. It has a blunt, hollow stylet protruding beyond its tip and a spring mounted at its base that holds the stylet in this position. When resistance is encountered the stylet is pushed inside and the sharp needle tip penetrates the tissue, but as soon as resistance disappears, the stylet protrudes again, indicating it to be in a free space. Thus this blunt stylet protects any viscera from damage during the introduction of needle into peritoneal cavity.

(b) Trocar and cannula :

Trocar and cannula is made of metal and are available in various outer diameter. In this study 9 mm diameter trocar has been used. The trocar sleeve, of hollow design has distally two small holes through which the gas can leak but by withdrawing trocar mandrel from the sleeve this air leak can be prevented. Trocar sleeve (cannula) has got different types of valve which prevents air leak. Valves may be either ball valve type or trumpet valve type. The trocar and cannula used in this study has ball valve. The proximal end of trocar sleeve has a hub to which pneumo-insufflator can be connected to replenish the air into the peritoneal cavity lost during introduction of telescope and examination.

(c) Air pump :

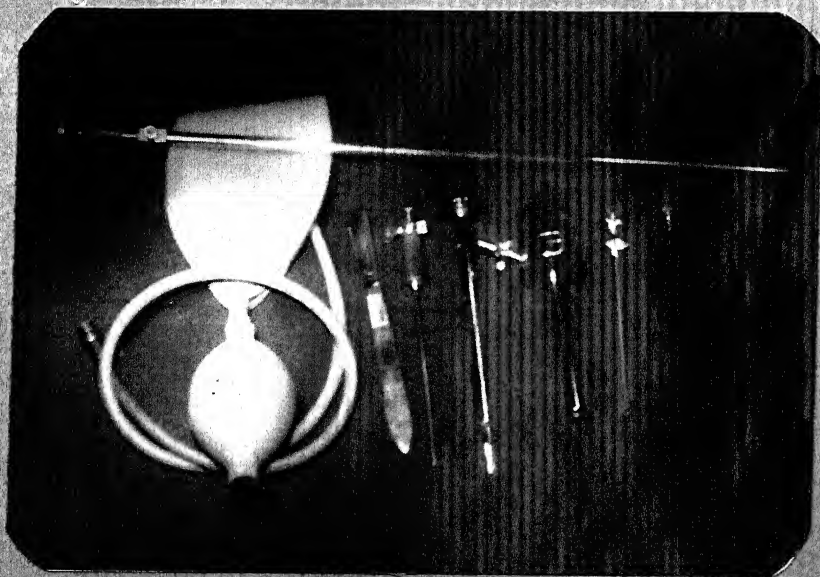
For creation of pneumoperitoneum various insufflators are available by which a controlled insufflation is done but to avoid the use of complicated equipment in this study a simple air pump i.e. sigmoidoscope air bulb was used to create pneumo-peritoneum. This bulb creates pneumo-peritoneum, sufficient to make anterior abdominal wall convex within two to three minutes and no complication has been encountered.

(iii) LIVER BIOPSY NEEDLE :

For taking biopsies under direct laparoscopic vision, simple liver biopsy needle (Vim Silverman) was used.

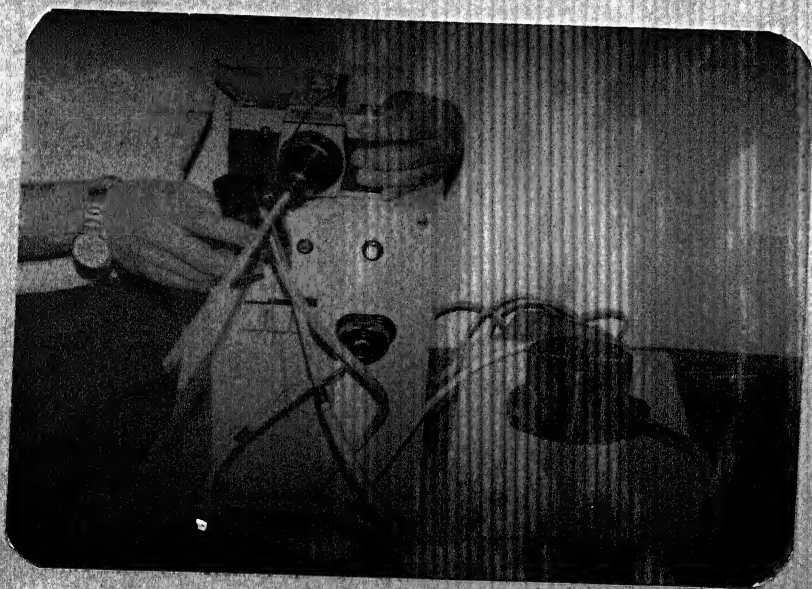
(iv) ENDOPHOTOGRAPHIC EQUIPMENT :

It comprises of a power supply unit which provides stablized voltage power to electronic flash tube fitted in lamp house and the reflex camera 'Praktika - L - Endoskopie' which can be quickly mounted on the eye piece funnel of the telescope. Colour stills were taken during laparoscopic examination using Kodacolor II 100 A.S.A. negative film.



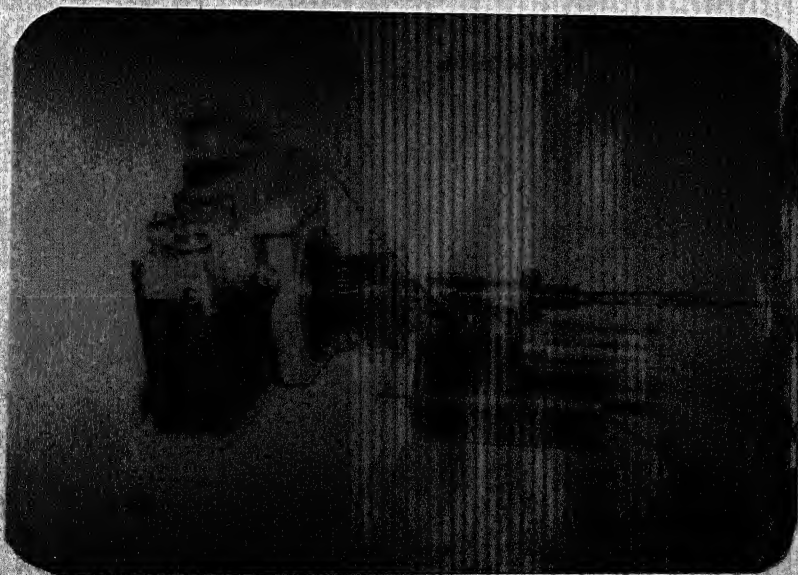
Photograph showing: from left to right

- Sigmoidoscope bulb with connection tube.
- Bard and Parker handle with blade.
- Verres needle.
- Trocar mandrel.
- Canula.
- Vim Silverman biopsy needle.
- Telescope (Horizontally placed).



Photograph showing :

- Light source with fibre optic cable.
- Endophotographic equipment.



Photograph showing :

- Camera mounted on Telescope  
with lamp house.

All the instruments except light source were regularly being sterilized in formalin vaporizer.

#### METHODS :

All the patients were interrogated in detail regarding their past and present ailments and examined thoroughly. The usual formal investigations were carried out in these cases. Patients were selected for laparoscopic examination either to confirm the diagnosis and to plan for early better surgery or to make out the exact diagnosis which could not be ascertained inspite of list of tedious and expensive investigations. But patients who were attending emergency facilities and needed laparoscopy were directly kept for laparoscopic examination, without undergoing routine or special investigations, to confirm the diagnosis, to impart quick and effective treatment.

#### Preparation of the patient :

Routinely general condition of the patient was improved and systemic infection was treated. Though on certain occasions laparoscopy

was carried out in patients suffering with systemic infection.

All patients were detailed about the procedure to be undertaken, to gain confidence and to prepare them to co-operate during the procedure.

In routine, patients were not given any thing orally atleast twelve hours prior to going to theatre and cleansing enema was given on the preoperative night. This preparation serves in reducing the gut motility and so the loaded gut is not there to produce hinderance while viewing the peritoneal cavity. Xylocaine sensitivity was also carried out on every occasion.

Premedication :

Usually local anaesthesia was preferred with sedative and analgesic. 10 mg of diazepam and 30 mg of pentazocine were given by intramuscular route half an hour prior to shifting the patient to operation theatre. Every patient was also given 0.6 mg of atropine forty five minutes prior to laparoscopic examination. In some cases sedative and analgesic was repeated during the procedure.

Preparation of operation theatre :

Laparoscopy is a surgical procedure so it was performed in operation theatre with full aseptic rituals and every time theatre was kept ready for emergency laparotomy to tackle any complication developing during the diagnostic procedure or for emergency laparotomy if suggested after examination.

During the whole procedure competent anaesthetist was available at the side of table to provide general anaesthesia if required otherwise routinely keeping watch on vitals of the patient.

Infiltration of local anaesthesia :

The abdomen was prepared as for laparotomy using savlon, surgical spirit and betadine and was covered by sterile towels leaving infra-umbilical region exposed.

1 percent xylocaine was injected at the proposed site for introduction of Verres needle and trocar and cannula. 10-15 ml of xylocaine was injected intra-dermally and intramurally upto the peritoneum in about one to one and half an inch diameter area. Usual site was 1 cm below the umbilicus in mid line.

Creation of pneumoperitoneum :

Many sites for introducing Verres needle and trocar cannula on the anterior abdominal wall can be used. The site for insertion of trocar must be chosen with regard to anatomic conditions and any adhesions, because of previous operation, that may be present. The over-riding consideration in choosing the site is good access to the organ to be examined. The common site is 1 cm below umbilicus in mid line. Same site for introducing Verres needle as well as trocar cannula was used.

After infiltration of xylocaine, a semi circular, convexity facing downward, sub umbilical incision is made through skin and subcutaneous tissue. The spring loaded Verres needle is checked for proper functioning. The abdominal wall is lifted with thumb and index finger of left hand at approximately 3 inches below the umbilicus and 2 inches to left of the mid line. The Verres needle is directed towards the pelvic inlet at a  $45^{\circ}$  angle. Precaution was taken that the needle is not introduced towards spine. The needle is advanced with thrusting motion rather than gentle pushing. The position of needle in peritoneal cavity was confirmed if needle is moving along the anterior abdominal wall freely and the tip

was palpable in both the iliac fossae and further confirmed by free passage of air into the peritoneal cavity. Hub of the needle is connected with rubber tubing adapter which snugly fits around hub and air is pumped by sigmoidoscope bulb (Saleh, 1978 and Geake et al, 1981) and abdominal wall is frequently checked for crepitus of subcutaneous emphysema indicating incomplete penetration with needle tip lying in preperitoneal space. Insufflation was terminated when uniform convexity of anterior abdominal wall developed and liver dullness was masked. The overdistention of the abdomen was prevented by frequent checking of pulse and respiration. Before withdrawing the needle, sounding test as advocated by Semm was performed to detect any adhesions around umbilicus. This was done by moving the Verres needle in all directions to check it's unrestricted movement.

#### Trocar introduction :

Creation of an adequate cushion by pneumoperitoneum permits the safe introduction of trocar without damaging intra-abdominal viscera. If the first incision was not found enough for the introduction of trocar, it was enlarged to admit 9 mm trocar.

After passing through the skin incision trocar was directed at 45 degree angle towards sacrum, strictly in mid line. The trocar was held in right hand between thumb, index and middle finger with the hub of trocar against thenar eminence. Trocar was advanced by bold twisting motion and never by jerky thrust to avoid injury to bowel loops. Trocar was withdrawn for 2-3 cm and then moved in up and down and side wise to check its position in the peritoneal cavity and it was further confirmed by removing the trocar from trocar sheath and listening for hissing sound produced by escaping gas which is immediately prevented by self acting valve. Trocar sheath could be moved in any direction as required.

#### Introduction of telescope and examination :

As a next step lighted telescope was introduced through trocar sheath after pressing the valve out of the way of telescope. This procedure was completed under vision and this helps in detecting any bleeding because of trocar insertion. Air pump was connected with hub of the trocar sheath to replenish the air lost during procedure.

The general inspection of peritoneal cavity was performed starting from pelvic organs,

uterus, tubes and ovaries were identified in females and bladder in males. Then by changing the direction of trocar sheath upper abdominal viscera were identified. Liver lobes were traced by identifying falciform ligament. Usually gall bladder fundus was visualized. Headup and head down and side tilt of the table help in examination of specific viscera.

Stomach, loops of intestine were visualized. Ascending colon, transverse colon and descending colon were identified by the presence of tenia coli. Sigmoid colon and caecum were always visualized during examination. On some occasions when biopsy was needed it was taken from the most representative area of pathology under direct vision by directly inserting liver biopsy needle over the tissue through abdominal wall.

#### Endoscopic photography :

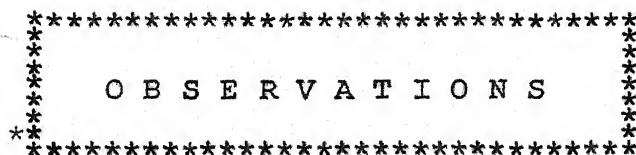
During the laparoscopic examination, where possible, coloured stills were taken by attaching camera to the eye piece of the telescope. Lamp house which conveys flash light generated by separate source was connected to the adapter on the proximal end of the telescope. Fibre optic

cord was attached to the nipple on lamp house. Aperture speed was adjusted to 1/30 th second. Intensity of flash was adjusted accordingly and after foccussing the object photograph was taken.

Termination of the procedure :

After completing the peritoneal cavity inspection and before withdrawing the telescope, paritoneal cavity especially dependent pelvic cavity was revisualized for any significant fresh blood. Under vision telescope was withdrawn. The valve on trocar sheath was opened to allow the escape of air from peritoneal cavity completely otherwise this may cause postoperative pain in abdomen.

Skin incision was closed by one deep simple stitch and wound dressed by Band-aid. The patient was returned to the ward. Ambulation was limited upto the afternoon of the procedure. Oral intake was allowed on the first postoperative day.



O B S E R V A T I O N S

Present study was conducted on a series of 49 patients of either sex and all age groups, admitted to M.L.B. Medical College and Hospital, Jhansi during session 1982-83. Twenty five males and 24 females constituted the whole group of patients.

TABLE - 1

: Distribution of patients according to sex

Sex	Number of patients
Male	25
Female	24
Total	49

TABLE - 2

: Distribution of patients according to age

Age group (in years)	Number of patients	Percentage %
0 - 15	4	8.2
16 - 30	14	28.57
31 - 45	17	34.7
46 - 60	11	22.43
61 - 75	3	6.1
Total	49	100

Table - 2 reveals distribution of patients according to their age in years. Maximum number, 17 (34.7%) patients belonged to the age group (31-45) years. Fourteen (28.57%) patients were found in group (16-30) years while 11 (22.43%) patients were belonging to age group (46-60) years. Four (8.2%) patients were examined in age group (0-15) years and lowest number of patients i.e. 3 (6.1%) patients belonged to age group (61-75) years.

Patients were examined and categorized under five arbitrary groups according to their clinical presentation and this distribution is presented here in table - 3.

TABLE - 3

: Indications for laparoscopy

Group	Indications	Number of Patients	Percentage %
I	Questionable liver status	11	22.43
II	Abdominal mass of questionable etiology	16	32.65
III	Chronic pain in abdomen of unknown etiology.	11	22.43
IV	Acute pain in abdomen of questionable etiology	7	14.29
V	Blunt injury abdomen	4	8.20
Total		49	100

Patients belonging to group I were those who presented with some liver disorder and were 11 (22.43%) in number. Group II comprises of 16 (32.65%) patients who were having intra-abdominal mass of questionable origin. Patients who had pain in abdomen

of longer duration were 11 (22.43%) in number and they constituted group III of this study. Seven (14.29%) patients were categorized under group IV and they presented with acute pain in abdomen. Last group of indication was for those patients who were attending the emergency for blunt trauma to the abdomen and associated injuries to other parts of the body.

TABLE - 4

GROUP I : Questionable liver status

Clinical diagnosis	Number of PATIENTS	Laparoscopic diagnosis
Secondaries liver	4	-Metastatic nodules (3 cases) -Normal liver.
Secondaries liver with obstructive jaundice	2	-Normal liver with white adhered gall bladder*. -Carcinoma gall bladder*.
Carcinoma liver	2	-Cirrhosis. -Metastatic nodules.
Cirrhosis liver	2	-Metastatic nodules. -Cirrhosis.
Portal hypertension	1	-Cirrhosis.
Total	11	

\*Laparotomy indicated.

Table - 4 depicts the breakup of group I patients and their diagnosis. Maximum number of patients were suspected to have secondary malignant deposits in the liver. Out of these 4 patients 3 were found to have various sizes of pale, umbilicated nodules on the surface of liver. Fourth patient had enlarged liver unaccompanied by nodules. In all the four cases laparoscopic directed needle biopsy was taken and was confirmed histopathologically.

Two patients who presented with obstructive jaundice and enlarged liver, were clinically diagnosed to be having secondary malignant deposits in liver. Laparoscopy revealed smooth surface of the liver, there was no evidence of secondary deposits but small whitish gall bladder together with inflammation and adhesions in the cholecystic bed was seen, carcinoma of the gall bladder was strongly suspected. In these two patients laparotomy was indicated as liver was normal. In one patient laparotomy confirmed the diagnosis but patient expired due to low general condition.

Out of two patients, suspected for carcinoma liver, one had metastatic nodules on the surface of liver and in other finely nodular cirrhosis was obvious. In two cases of suspected cirrhosis liver, one had cirrhosis and other had metastatic nodules. Last patient with enlarged liver, was diagnosed cirrhosis liver. In all cases guided needle biopsy was taken.

TABLE - 5

GROUP II : Intra-abdominal mass of questionable  
etiology

Clinical diagnosis	Number of patients	Laparoscopic diagnosis
(a) Suspected diagnosis	9	
Ovarian cyst	2	-Ovarian cyst(both cases).
Kidney cyst	1	-Hydatid cyst of liver.
Mucocele gall bladder	1	-Cystic disease liver.
Pedunculated fibroid	1	-Didulphous uterus.
Ileocacal mass	1	-Retroperitoneal mass.
Tubercular adenitis	1	-Lymphnode mass*.
Carcinoma stomach	1	-Jumbled mass of small bowel with enlarged nodes.
Lymphoma	1	-Irregular mass of nodes*.
(b) Under observation no clinical diagnosis achieved.	7	-Ovarian cyst. -Hydatid cyst. -Irregular mass of lymphnodes*. -Hypertrophic tuberculosis with mobile caecum. -Secondaries lymphnodes*. -Hepatoma*. -Negative:

\* Biopsy taken.

Table-5 shows the laparoscopic diagnosis in group II patients. Out of 16 patients, in 9 origin and provisional diagnosis of the abdominal mass was made clinically and in 7 no diagnosis could be ascertained.

In 4 out of 9 patients clinical diagnosis was confirmed while on 5 occasions suspected clinical diagnosis was ruled out and the real site of origin of the mass was detected after laparoscopy.

In one case, cystic swelling was clinically thought to be cystic kidney as it was bimanually palpable and ballotable but on laparoscopy it was found to be arising from liver. This cyst was surgically removed and the diagnosis was hydatid cyst. In other case with clinical diagnosis of mucocoele, gall bladder was found normal on laparoscopy and cysts were seen on the surface of liver. One cyst was large enough to mimic gall bladder. Third case who presented with a firm, irregular mass in left hypochondrium and epigastrium, was suspected to be a case of carcinoma stomach. On laparoscopy, this

mass was nothing but a jumbled mass of small bowel with lymphnodes. This patient responded to antitubercular treatment. In fourth patient, a female, mass in lower abdomen was suspected to be a pedunculated fibroid but it was found to be a pregnant ruptured right cornu of didelphous uterus. Last patient in this group was having retroperitoneal tumour.

In seven patients where no clinical diagnosis could be made, laparoscopy was helpful in six cases while it failed in one case where laparotomy revealed a intramural mass in transverse colon. In one interesting case, a firm irregular, freely mobile mass was found to be hypertrophic ileocaecal tuberculosis with mobile caecum. In rest of the five cases diagnosis was ovarian cyst, hepatoma, secondaries in lymphnodes and mass of irregular nodes ( biopsy confirmed tubercular origin ). In this group needle biopsy was taken in five cases. In eight patients laparotomy was indicated and in 7 cases laparotomy was avoided as they required conservative treatment.

TABLE - 6

GROUP III : Chronic pain in abdomen of unknown etiology

Clinical diagnosis	Number of patients	Laparoscopic diagnosis
(a) Under observation	6	-Chronic cholecystitis (2 cases). -Mobile caecum. -Miliary tuberculosis (2 cases). -No evident pathology.
(b) Clinical diagnosis	5	
-Carcinoma peritonei	1	-Miliary tuberculosis.
-Koch's abdomen	4	-Hypertrophic tuberculosis -Endometriosis. -Mobile caecum. -No evident pathology.

Laparoscopic diagnosis in group III patients is being presented here in table 6. In more than 50% of patients no clinical diagnosis could be reached inspite of all available investigations. In such 6 patients, in 5 cases pathology was detected while in one patient no evident pathology was there; this last patient was discharged with assurance and had no pain after examination. Out of 5 cases where diagnosis was achieved, two patients had white contracted gall bladder with

little adhesions. Cholecystectomy was done and gall bladder was showing evidence of cholecystitis, both the cases were relieved of their symptoms after surgery. In two cases characteristic miliary tubercles were detected all over the omentum and small bowel. Both of these cases responded to antitubercular treatment. In last case caecum was not found in it's normal location of right iliac fossa but on exploration it was found in umbilical region and this patient improved after caecopexy.

In an old patient who had pain in abdomen of long duration and ascitis of recent origin, carcinoma peritonei was the suspected clinical diagnosis. After drainage of ascitis laparoscopy revealed miliary tubercles all over small bowel, omentum, large bowel and peritoneum. Patient was kept on antitubercular treatment.

In remaining 4 patients who were suspected to harbour tubercular pathology, tubercular lesion was detected only in one case. Other two patients had endometriosis and mobile caecum respectively. In the last case only, neither pathology was evident nor the patient was relieved of symptoms, exploratory laparotomy was undertaken to find a long, fibrosed

retrocaecal appendix with adhesions to caecum. Patient was relieved after appendicectomy. This was the only failure in this group. In rest of the 10 patients, on 5 occasions laparotomy was avoided and in other 5 cases laparotomy was undertaken as a mode of management.

TABLE - 7

GROUP IV : Acute pain in abdomen of questionable etiology

Clinical diagnosis	Number of patients	Laparoscopic diagnosis
(a) Acute appendicitis	4	-Ruptured luteal cyst with haemorrhage. -Inflamed appendix. -Salpingitis. -No evident pathology.
(b) Under observation	3	-Small bowel infarction. -No evident pathology (two cases).
Total	7	

In table 7 results of laparoscopic examination in group IV patients have been shown. In four cases appendicitis was the probable diagnosis but on only one occasion inflamed appendix was visualized per laparoscope. In second case where

acute appendicitis was strongly suspected, laparoscopy revealed ruptured luteal cyst with haemorrhage in pelvic cavity. In third case, fallopian tube was found inflamed, oedematous and little pus was present. In last case laparoscopy failed to provide any clue for positive investigations suggestive of acute infective pathology. Laparotomy was carried out, sub serous, retrocaecal inflamed appendix was found.

In other three cases where no clinical diagnosis could be ascertained, laparoscopy revealed pathology in one case where gangrenous small bowel was seen. In one out of remaining two cases where no evident pathology was seen, laparotomy was done as patients symptoms were progressive, again inflamed sub serous appendix was found. While other patient was managed conservatively.

In this group laparotomy was saved on two occasions and in one case where laparoscopy failed, laparotomy was diagnostic as well as therapeutic.

TABLE - 8

GROUP V : Blunt injury to the abdomen

Clinical diagnosis	Number of patients	Laparoscopic diagnosis
Splenic rupture	1	- Splenic tear.
Intra-abdominal bleeding	3	-Splenic tear -No evidence of intra-abdominal haemorrhage(two cases).

Table - 8 shows results in four patients admitted with blunt trauma to the abdomen and associated multiple injuries to other parts. In two cases splenic tear was detected, while on two occasions no evidence of intra-abdominal haemorrhage was found. So in this way laparotomy was undertaken in two patients immediately and avoided in two cases who were managed conservatively and treated for other injuries safely and with confidence.

TABLE - 9

:Results of laparoscopy in various groups

Group	Number of patients	Successful laparoscopy	
		Number of patients	Percentage
I	11	11	100
II	16	14	87.5
III	11	10	90.9
IV	7	5	71.4
V	4	4	100

Table - 9 summerizes results of laparoscopic examination in this study. In group I and group V spectacular success was achieved. In one patient of group I biopsy tissue was not identifiable, in group IV success rate was only 71.4%. In group III and II 90.9 and 87.5% success could be realized respectively.

TABLE - 10

:Laparotomy avoided or indicated in various groups

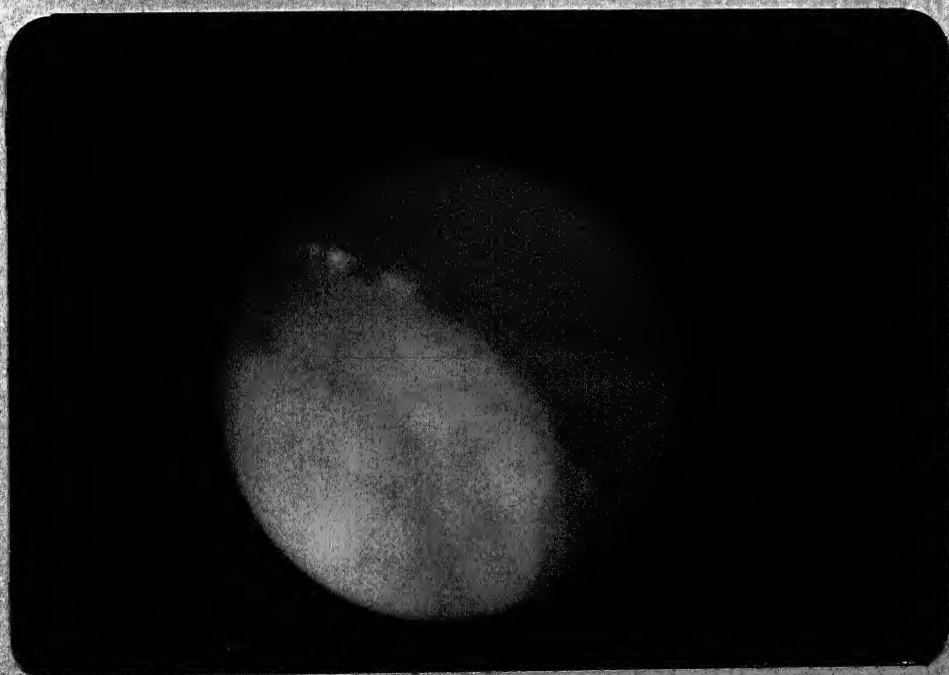
Group	Number of patients	Laparotomy	
		Indicated	Avoided
I	11	2	9
II	16	8	6
III	11	5	5
IV	07	3	2
V	04	2	2
Total	49	20	24

After laparoscopic examination it was observed that laparotomy was judiciously avoided in 24 cases and was indicated as management in 20 cases. Laparoscopy failed to provide any clue for the underlying pathology in 5 cases. Laparotomy was helpful in 4 cases and in one case no further diagnostic procedure was undertaken. Failure was only because either the pathology was not on the surface or hidden in retroperitoneal space.

In the present study laparoscopic examination was carried out under local anaesthesia with sedative and analgesic in 42 cases and in 7 cases under the effect of general anaesthesia.

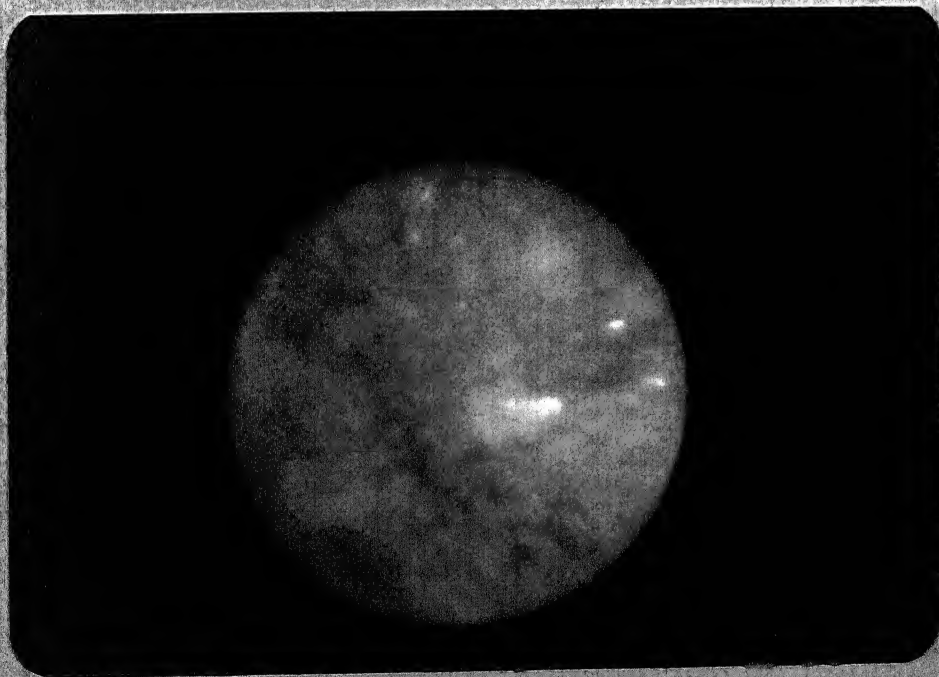
Complication :

Few complications were encountered in this study but they were not serious except on one occasion when liver bleeding did not stop after some time from the site of needle biopsy. To check this bleeding mini laparotomy was done and liver was stitched over jelfoam. On one occasion minor serosal tear of the caecum was observed but no specific management was required for it. In two cases minor sepsis developed at the site of incision.



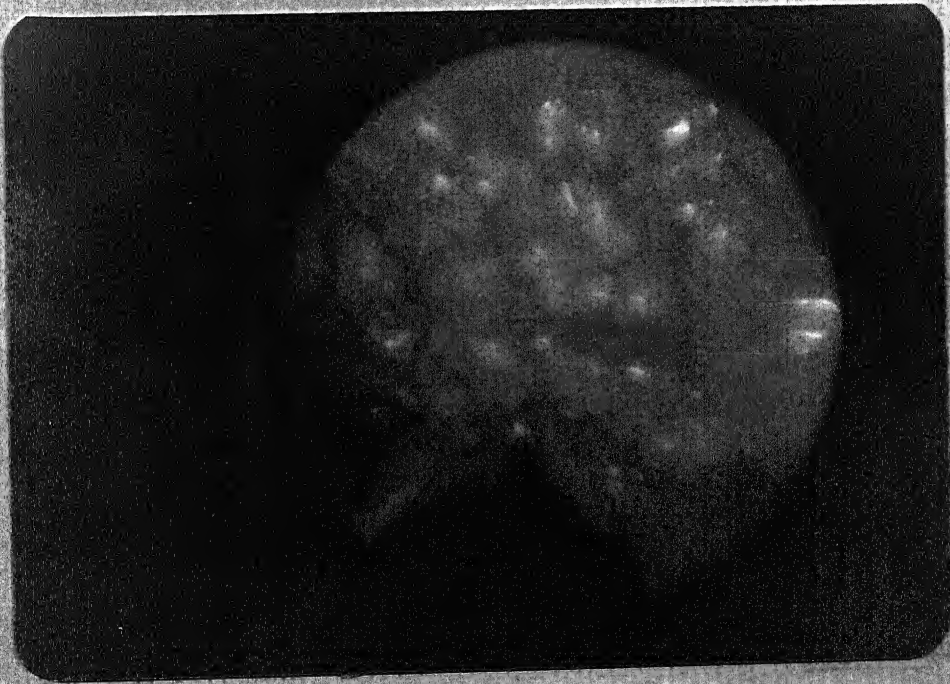
Photograph showing :

- Liver with Gall bladder.



Photograph showing :

- Miliary tubercles on peritoneum  
(Miliary tuberculosis).



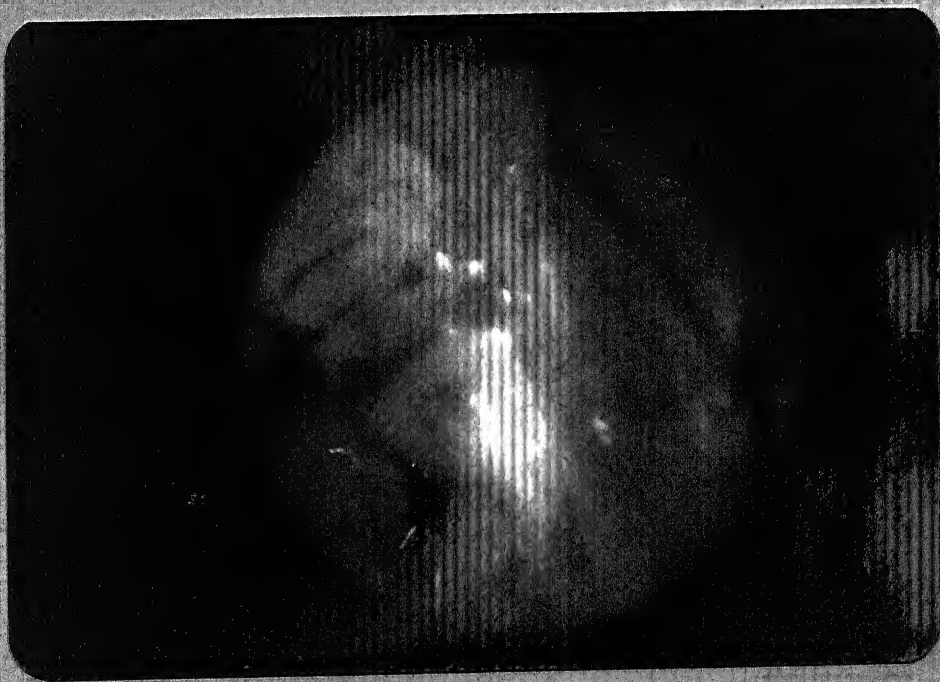
Photograph showing :

- Military tubercles on small bowel  
(Military tuberculosis).



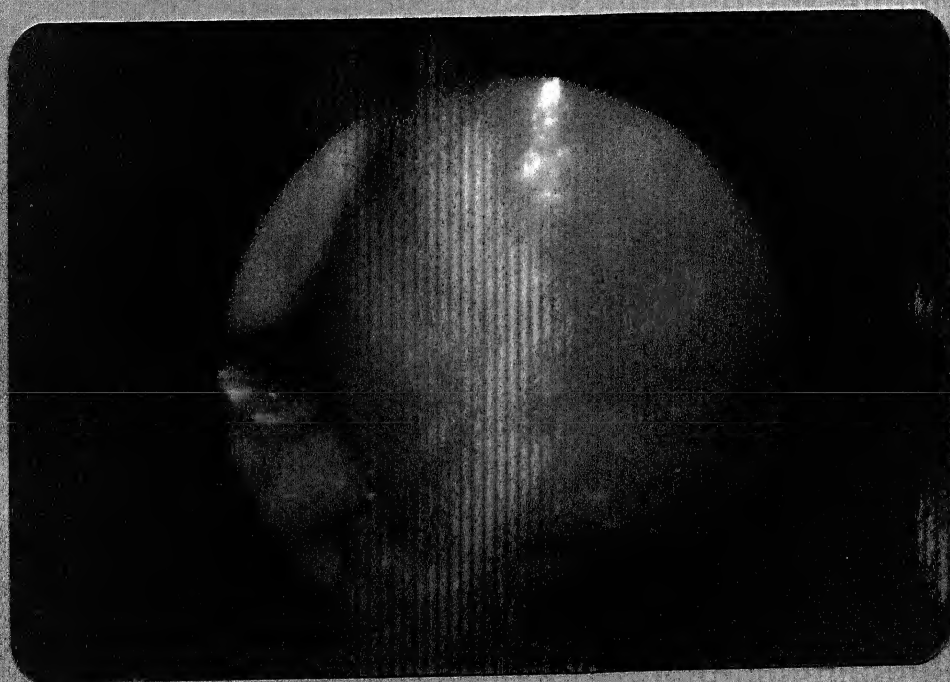
Photograph showing :

- Caecum.



Photograph showing :

- Ovary with fallopian tube.



Photograph showing :

- Upper surface of uterus.



## DISCUSSION

The abdominal surgeon is sometimes asked to perform an "exploratory laparotomy" to establish a diagnosis when other diagnostic modalities of lesser magnitude have been unproductive and indecisive. Should the abdominal exploration not allow definitive surgical correction of the clinical problem, then the surgeon faces the uncomfortable prospect of exposing a patient to the customary hazards of general anaesthesia and the potential complications attendant on laparotomy without benefit.

Strangely the literature on exploratory laparotomy in recent decades is rather scant. Piedrahita and Butterfield (1976) evaluated exploratory laparotomy as a diagnostic procedure, they reported an operative mortality of 10 percent and a complication rate of 22 percent. In a similar review in 1970, Scott et al reported 15 percent mortality and 43 percent morbidity.

Any procedure that allows one to see the diseased organ clearly and sharply through a mere puncture, without much discomfort to the patient is ideal. Laparoscopy is such a procedure. Mortality and morbidity have been very low, almost negligible. Antia (1952) and Vilardell (1964) reported mortality of .2% and .11% respectively. So it is evident that laparoscopy is quite safe and as it is performed under local anaesthesia and sedation, the complications of general anaesthesia are thus avoided.

Accurate assesment of the extent, progression of disease and the need to obtain a tissue diagnosis is important for proper planning of therapy and evaluation of effectiveness. Laparoscopy has a large part to play in this role.

With the advent of computarized axial tomography, improved ultrasound techniques, as well as liver and spleen scanning, this procedure has been used less for determining the operability of known primary lesion in recent years. These highly expensive investigations only create an index of suspicion of abnormality rather than being diagnostic. By laparoscopy one can visualize the

lesion directly and can get the idea of nature of the lesion and can also take biopsy under vision from the most representative area of pathology. With well known advantage, it looks that the procedure is still underutilized. In part, this reluctance can be attributed to traditional conservatism with which every scientific thought is confronted. However, this endoscopic method has hardly met with a clinical mishap which could serve as a hinderance to its acceptance.

In the present study only 49 patients were included. The male and female ratio is almost equal, this is a random finding but in group IV, patients with acute pain in abdomen, it was desired that maximum patients should belong to female sex because the origin of pain in lower abdomen is very much confusing.

In this study, patients were categorized in five arbitrary groups as per indication for examination. This arbitrary grouping was consequent to the observations of general trends with which majority of patients presented themselves at the emergency and in wards in the past and the problem they posed for establishing clinical diagnosis.

Success or failure was registered in terms of whether or not the purpose for which laparoscopy was undertaken, was achieved. By this criterion 89.8% success was realized in the present series. Almost similar success has been achieved by other workers in past. Friedman and Wolf (1978) reported 94% success in a group of 140 patients; Saleh (1978) achieved 87% success in a series of 49 patients, Coupland et al (1981) reported 86% success in a series of 236 patients. Similar results can be attributed to uniformity of technique and more or less similar indications. However earlier studies did not deal much with cases of pain in abdomen.

Laparoscopy's greatest value lies in visualization of liver and taking biopsy under direct vision. Percutaneous needle biopsy of the liver, a blind procedure, is an accepted technique to evaluate patients who are suspected of having diffuse hepatic disease and in the search of liver metastasis. This procedure provides only 30-65% positive results as reported by Nelson and co-workers (1966), Chan (1967) and Alpert et al (1969).

Liver biopsy done during laparoscopy affords the added advantage of gross inspection of

liver, the needle can be aimed accurately and the specimen can be taken under direct vision. Further more safety is enhanced, since hollow viscera and blood vessels can be avoided and the biopsy site monitored until bleeding has stopped. Cuscheri (1975) found laparoscopy superior to blind biopsy in retrieval of secondary malignant tissue from the liver, 80 percent as compared to 40 percent of blind biopsy, while in diffuse liver disorders, results were only marginally superior.

In the present study, laparoscopy was helpful in all cases in group I, where liver status was to be confirmed. Only in one case the liver tissue taken for biopsy could not be identified by pathologist but gross anatomy was clearly suggestive of metastatic implants on the liver. Many workers have reported such diagnostic success in patients with liver pathology where clinical diagnosis was confirmed or proved wrong. Antia (1963) reported 94% success, Ivan et al (1964) 86.9% success, Berci et al (1973) 92.3% success, Saleh (1978) 86.2% and Coupland et al (1981) 90.9%. In all these studies minor failure rate has been attributed to improper visualization. None of the study mention failure of

diagnosis where visualization was adequate. This can probably be attributed to the well defined and characteristic appearance of the lesion.

This study confirmed the use of laparoscope in assessing palpable abdominal masses. In comparison to group I success, results are little poor in this group II (abdominal lump of questionable origin). It is attributable to a retroperitoneal tumour and one intramural tumour of transverse colon. However, these were all difficult cases and to solve them without full scale exploratory operation is noteworthy achievement. In the present series 87.5 percent success was realized in patients with ill-defined masses. The success rate in the present series is supported by other reports in the literature. Berci et al (1972) reported 100% success in only 11 patients, Mosenthal (1972) was not very successful in diagnosing origin of lump in his series of 10 patients. Three patients had retroperitoneal tumour and in one intramural tumour of sigmoid colon was detected on laparotomy. Saleh (1978) reported a diagnostic accuracy in excess of 85 percent. Friedman and Wolf succeeded only in 70% cases and attributed failure to abdominal scarring. In the recent years Hall et al (1980) and Coupland

et al (1981) reported success, in little more than 80 percent cases. The main derogatory factor concluded on the basis of these studies continued to be improper visualization.

Invariably patients are presenting with pain in abdomen of long duration with other associated features. In such cases prior to establishment of laparoscopy, laparotomy was the only answer. Though on some occasions laparotomy will provide the diagnosis but it is of no help in treatment and on some occasions no evident pathology is found and the patient is subjected to unwarranted complications of laparotomy as well as general anaesthesia. In it's stage of infancy when endoscopy was more at the level of research rather than an established investigation, its routine use for confirming diagnosis was seen with suspicion.

In the present study patients complaining of chronic abdominal pain were included who were referred from other centres to this hospital. Treatment history revealed that 81.8% cases (9 patients) were taking antitubercular treatment for quite a long time, without any relief of symptoms, as prescribed empirically to them by treating physicians as koch's abdomen is one of the commonest cause of chronic abdominal pain.

These patients were subjected to laparoscopy to find out the real cause of pain. It was found that 4 cases had Koch's lesion, two showed mobile caecum with adhesions who improved after caecopexy, one had endometriosis and two cases were found with normal abdomen as there was no evident pathology. In one such patient, pain persisted after laparoscopic examination. Laparotomy was undertaken, a long fibrosed appendix was found, histopathology confirmed it to be a recurrent appendicitis. Other patient improved after examination and assurance with supportive treatment.

Other two cases were found to have chronic cholecystitis and they improved after cholecystectomy. Results in the present study are considerably better in this group, than as reported in previous studies by Mosenthal (1972), Friedman and Wolf (1978). Anteby et al (1973) and Geake et al (1981) have reported acceptable success in determining the cause of pain. Better results of this study may be attributed to rampant tuberculosis in this part of the world. Wittman (1966) and Geake et al (1981), both have stressed the utility of laparoscopy in detecting tubercular pathology in peritoneal cavity.

Every emergency room has numerous patients with acute pain in abdomen where clinical findings and investigations do not provide any conclusive diagnosis. Sometimes on surgical exploration peritoneal cavity and it's contents are found normal and if the diagnosis is achieved, it may or may not require surgical treatment. In such cases laparoscopy is much more helpful.

Deutsch et al (1982) believes that about one third appendicectomies are performed unnecessarily. Thomas and Muller (1969) have also indicated 20-30% diagnostic error for appendicitis in patients presenting with acute pain in abdomen. Lewis et al (1975) reported overall negative appendicectomy rate as 20% but in women of fertile age group it exceeded 40%, probalby because of more common occurance of inflammatory diseases of pelvic organs in fertile age group females.

Chang et al (1973) have reported that complications after negative appendicectomies are much higher than negative laparoscopy. Barnes et al (1962) and Gilmore (1975) have reported significant death after unnecessary appendicectomies, subjecting a patient to stress of anaesthesia, surgical trauma

and dissemination of infection. It seems that any procedure which can save negative appendicectomies and provide real nature of pathology should be employed in such patients, and laparoscopy has provided 70% percent success in this group of patients in present study. In two cases out of 7, laparoscopy was negative while patients had acute appendicitis. But in other 4 cases diagnosis was made and one patient with normal abdomen improved with conservative treatment. In 2 patients out of 4, with suspected appendicitis, appendicectomy was avoided though laparotomy was done in one patient for ruptured luteal cyst with haemorrhage in pelvic cavity and other managed conservatively for salpingitis. In other 3 patients, in one patient planned resection of infarcted bowel was done, in second exploratory laparotomy was done and third managed conservatively.

Wheless (1976) and Jersky et al (1980) concluded that laparoscopic demonstration of apparently normal appendix is by itself, insufficient ground for excluding acute appendicitis and that this, can only be done safely if florid, obviously pathological extra appendiceal lesions are seen, preferably together with normal appendix.

Anteby et al (1973) reported confirmation of acute appendicitis in only 5 cases and avoided laparotomy in 16 cases out of 25 cases suspected to have acute appendicitis.

Sugarbaker et al (1975) avoided laparotomy on 18 occasions out of 29 patients after laparoscopic examination in patients with acute abdomen. Leape and Romenofsky (1980) and, Anderson and Bridgewater (1981) reported impressive results in this group. These studies also strengthens acceptable success with acute abdominal cases in this study but Jersky et al (1981) concluded that laparoscopy is not likely to reduce the incidence of negative laparotomies.

In patients with multiple trauma, classic symptoms do not apply and local signs are absent or misleading. Symptoms and signs associated with haemorrhage usually appears late, either masked by compensatory mechanism or drowned in a general picture of shock. Important delays can occur that may prove fatal or unnecessary laparotomy is performed. But if laparoscopy is performed in such patients then the presence of intra abdominal haemorrhage can be detected with the site of injury or can be ruled out. In present study, in all the four cases

laparoscopy was helpful. On two occasions detecting haemorrhage and the site of injury and in other two cases no intra-abdominal bleeding was detected and they were managed accordingly for other injuries.

This success is also supported by reported success in previous studies. Tostivint (1971) detected cause of haemorrhage in 44 out of 75 cases and Cortesi et al (1979) in 56 out of 95 cases. They claimed, laparoscopy is far superior than paracentesis which fails when bleeding is small or it is localized and it can not detect the site of bleeding.

Laparoscopic examination avoided unnecessary laparotomies on 24 occasions and it was indicated on 20 occasions. But after laparoscopic examination laparotomy was not an exploratory one but this time it was a planned laparotomy with modified incision for correction of a known lesion.

In present series 81.6 percent patients were examined under local anaesthesia with sedative and analgesics. Local anaesthesia was adequate and risks of general anaesthesia were avoided and especially in patients with poor general condition.

Gaisford (1975), Saleh (1978), Friedman and Wolf (1978), Hall et al (1980) and Coupland et al (1981), they all used local anaesthesia and results were equally good when compared with other studies conducted under general anaesthesia.

Blind liver biopsy, endoscopic retrograde cholangiopancreatography, liver scintiscanning, selective arteriography and ultra-sound are all well established techniques with their values and limitations. Nevertheless, laparoscopy represents a valuable alternative, especially when the intra-abdominal disease remains obscure and when other diagnostic techniques have failed and it is important to consider or to avoid laparotomy and when direct vision of the lesion and tissue diagnosis become mandatory.

Evident from the study, it is a fact that laparoscopy is of great diagnostic value in the various situations mentioned above. This technique avoiding the risks of general anaesthesia, gives us a quick mode of diagnosis, influencing the confidence for subsequent management and avoidance of surgery.



## C O N C L U S I O N S

Forty nine consecutive instances of laparoscopy in general surgical and few medical cases are reported. Detailed analysis supplies evidence that with rare minor complications, complex diagnostic problems in which the disease involves the peritoneal cavity and its contents can be elucidated by means of laparoscopy.

- Under laparoscopic control much of the liver can be visualized directly and the distribution of lesions can be determined. Direct target biopsy of selected areas can be obtained from an optimal location. Any bleeding site is recognized immediately and can be controlled promptly.
- By laparoscopy, most of the times origin and location of the illdefined abdominal masses can be made and if needed diagnosis can be strengthened by biopsy from the most representative area of pathology.

- Retroperitoneal tumours can not be visualized. Similarly tumour inside the hollow viscera can not be detected.
- Laparoscopy is definitely helpful in detecting or ruling out tubercular pathology in peritoneal cavity.
- Non calculous chronic cholecystitis where cholecystography is normal can be detected by gross inspection of gall bladder.
- Laparoscopy is of especial value when clinical and laboratory investigations for abdominal pain fail to determine a cause. Negative laparoscopy is reassuring to both physician and patient and is significant when emotional factors are suspected.
- In patients with acute abdominal conditions, when findings are atypical, uncertainty in diagnosis may be resolved by laparoscopy. It is more helpful in female patients where acute appendicitis is confused with inflammatory conditions of female pelvic organs.
- When the determination of the presence or absence of blood and damage to any viscera

in the peritoneal cavity is essential for the complete diagnosis of trauma, laparoscopy is far superior and more accurate diagnostic measure than the various taps and irrigations now in popular use.

- Frequently laparoscopy has rendered unnecessary, a number of more hazardous diagnostic or therapeutic approaches in common use.
- In defining the role of laparoscopy in clinical practice, it is essential to formulate suitable indications for its performance.
- The laparoscopist can visualize only those structures which present themselves anteriorly within the abdomen. He can biopsy only those solid organs and areas of parietal peritoneum which are visible to him, and may obviate a needless laparotomy in some patients or may find evidence which justifies recommendation of such a procedure in others.

So it is concluded that laparoscopy should assume an important role in the general surgeon's study of abdominal disease and in emergency it should be used as routinely as radiography.

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APPENDIX

CASE SHEET

M.R.D. No.	Surgeon I/C .....
Name of the patient	Sl. No.
Religion	Age/Sex
Address	
Occupation	Socio Economic status
D.O.A.	D.O.D.
Chief Complaints	
Family History	
Past History of illness	
Personal History	
H/O Present illness	

General examination

- GC	- Jaundice
- Pulse	- Clubbing
- B.P.	- Oedema
- Temperature	- Nutrition
- R/R	- Liver
- Pallor	- Spleen
- Cyanosis	

Specific examination (Abdomen)

Systemic examination

- C.V.S.
- C.N.S.
- Resp.

Investigations : Routine

- Blood
- Urine
- Blood            Sugar        Urea
- Stool

Special investigations

Clinical diagnosis

Laparoscopy done under G.A./Local A.  
Findings -

Laparoscopic Diagnosis

Laparotomy done/not done

Operative findings

Biopsy report -

Final Diagnosis -